Advanced Wheelchair

More than one million people in the United States rely on wheelchairs for mobility and many of them have difficulties with existing types of chairs. Among the problems are heaviness, which makes the chair hard to handle, frequent breakdowns and limited chair lifetime, which results in high life-cycle costs. Recognizing these problems, the Veterans Administration and the National Insitute of Handicapped Research have sponsored several wheelchair research projects.

Most projects have focused on improving components rather than on development of an entirely new chair. One cooperative effort, however, undertook full-scale development—from analysis of requirements through prototype fabrication and evaluation—of an advanced wheelchair based on aerospace technology. Langley Research Center teamed with the University of Virginia (UVA) Rehabilitation Engineering Center, Charlottesville, Virginia in developing the prototype shown at left. NASA funded Langley's part of the program; UVA funding was provided by the National Institute of Handicapped Research. Also participating in the program is the NASA-sponsored Research Triangle Institute (RTI) Application Team, Research Triangle Park, North Carolina.

The Langley/UVA developers employed aerospace computerized structural analysis techniques to arrive at the optimum design and used aerospace composite materials, which are generally lighter but stronger than metals. The resulting chair weighs only 25 pounds but has the same strength and weight-bearing capability as a 50-pound stainless steel wheelchair. It can be collapsed for auto stowage as shown below; it also features a solid seat, wheel guards, dynamic brakes and shaped hand rims, a footrest with smooth contours to aid in opening doors. Langley built four test models of the chair; the prototype was well received when shown last year at the International Conference on Rehabilitation Engineering in Ottawa, Canada. The RTI Application team is discussing possible commercial production of the advanced wheelchair with several interested manufacturers.